U.S. DEPARTMENT OF COMMERCE
National Technical Information Service

PB-257 974

Lake Purdy, Jefferson and Shelby Counties, Alabama

Environmental Monitoring and Support Lab, Las Vegas, Nev

Prepared for

Alabama Water Improvement Commission, Montgomery

Jul 76

TECHNICAL REPORT DATA
(Please read Instructions on the reverse before completing)

1. REPORT NO.	2.	3. RECIPIENT'S ACCESSION NO.

4. TITLE AND SUBTITLE
Report on Lake Purdy, Jefferson and Shelby Counties, Alabama

5. REPORT DATE
Prepared July 1976

6. PERFORMING ORGANIZATION CODE

7. AUTHOR(S)
Anonymous (National Eutrophication Survey Staff)

8. PERFORMING ORGANIZATION REPORT NO.
Working Paper No. 234

9. PERFORMING ORGANIZATION NAME AND ADDRESS
National Eutrophication Survey
U.S. Environmental Protection Agency
P.O. Box 15027
Las Vegas, NV 89114

10. PROGRAM ELEMENT NO.

11. CONTRACT/GRANT NO.

12. SPONSORING AGENCY NAME AND ADDRESS
Office of Research and Development
U.S. Environmental Protection Agency
401 M Street, S. W.
Washington, DC 20460

13. TYPE OF REPORT AND PERIOD COVERED
Final - 1973

14. SPONSORING AGENCY CODE

15. SUPPLEMENTARY NOTES
Prepared in cooperation with the U.S. Environmental Protection Agency, Corvallis Environmental Research Laboratory, Eutrophication Survey Branch, Corvallis, OR 97330

16. ABSTRACT
Annual total phosphorus and total nitrogen loadings to the lake were estimated and subdivided according to either point or non-point source origin. An assessment of the lake's trophic condition and limiting nutrient is also provided. All data collected by the U.S.E.P.A. National Eutrophication Survey during the one year study of the lake and its tributaries are included in the report.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
eutrophication lakes nutrients phosphorus nitrogen loading		05B 05C

18. DISTRIBUTION STATEMENT	19. SECURITY CLASS (This Report)	21. NO. OF PAGES
Release unlimited		42
	20. SECURITY CLASS (This page)	22. PRICE
		4.00

PRICES SUBJECT TO CHANGE

279054

PB 257 974

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL EUTROPHICATION SURVEY

WORKING PAPER SERIES

CORVALLIS ENVIRONMENTAL RESEARCH LABORATORY - CORVALLIS, OREGON

and

ENVIRONMENTAL MONITORING & SUPPORT LABORATORY - LAS VEGAS, NEVADA

REPRODUCED BY
NATIONAL TECHNICAL
INFORMATION SERVICE
U. S. DEPARTMENT OF COMMERCE
SPRINGFIELD, VA. 22161

G.P.O. 699-440

REPORT
ON
LAKE PURDY
JEFFERSON AND SHELBY COUNTIES
ALABAMA

EPA REGION IV

WORKING PAPER No. 234

WITH THE COOPERATION OF THE

ALABAMA WATER IMPROVEMENT COMMISSION

AND THE

ALABAMA NATIONAL GUARD

JULY 1976

1a

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FOREWORD

The National Eutrophication Survey was initiated in 1972 in response to an Administration commitment to investigate the nationwide threat of accelerated eutrophication to freshwater lakes and reservoirs.

OBJECTIVES

The Survey was designed to develop, in conjunction with state environmental agencies, information on nutrient sources, concentrations, and impact on selected freshwater lakes as a basis for formulating comprehensive and coordinated national, regional, and state management practices relating to point source discharge reduction and nonpoint source pollution abatement in lake watersheds.

ANALYTIC APPROACH

The mathematical and statistical procedures selected for the Survey's eutrophication analysis are based on related concepts that:

a. A generalized representation or model relating sources, concentrations, and impacts can be constructed.

b. By applying measurements of relevant parameters associated with lake degradation, the generalized model can be transformed into an operational representation of a lake, its drainage basin, and related nutrients.

c. With such a transformation, an assessment of the potential for eutrophication control can be made.

LAKE ANALYSIS

In this report, the first stage of evaluation of lake and watershed data collected from the study lake and its drainage basin is documented. The report is formatted to provide state environmental agencies with specific information for basin planning [§303(e)], water quality criteria/standards review [§303(c)], clean lakes [§314(a,b)], and water quality monitoring [§106 and §305(b)] activities mandated by the Federal Water Pollution Control Act Amendments of 1972.

Beyond the single lake analysis, broader based correlations between nutrient concentrations (and loading) and trophic condition are being made to advance the rationale and data base for refinement of nutrient water quality criteria for the Nation's freshwater lakes. Likewise, multivariate evaluations for the relationships between land use, nutrient export, and trophic condition, by lake class or use, are being developed to assist in the formulation of planning guidelines and policies by the U.S. Environmental Protection Agency and to augment plans implementation by the states.

ACKNOWLEDGEMENTS

The staff of the National Eutrophication Survey (Office of Research and Development, U.S. Environmental Protection Agency) expresses sincere appreciation to the Alabama Water Improvement Commission for professional involvement and to the Alabama National Guard for conducting the tributary sampling phase of the Survey.

E. John Williford, Chief, Surveillance and Monitoring Section; and John C. Chitwood, Biologist, Surveillance and Monitoring Section; and Sam L. Coleman, Water Quality Planning Section; and M. H. Floyd, Engineer, Surveillance and Monitoring Section; and Truman Green, Engineer, Municipal Waste Control Section; and Tim McCartha, Biologist, Surveillance and Monitoring Section; and James E. McIndoe, Engineer, Water Quality Planning Section; and Richard T. Maddox, Engineer, Industrial Waste Control Section; and James T. White, Engineer, Municipal Waste Control Section provided invaluable lake documentation and counsel during the course of the Survey.

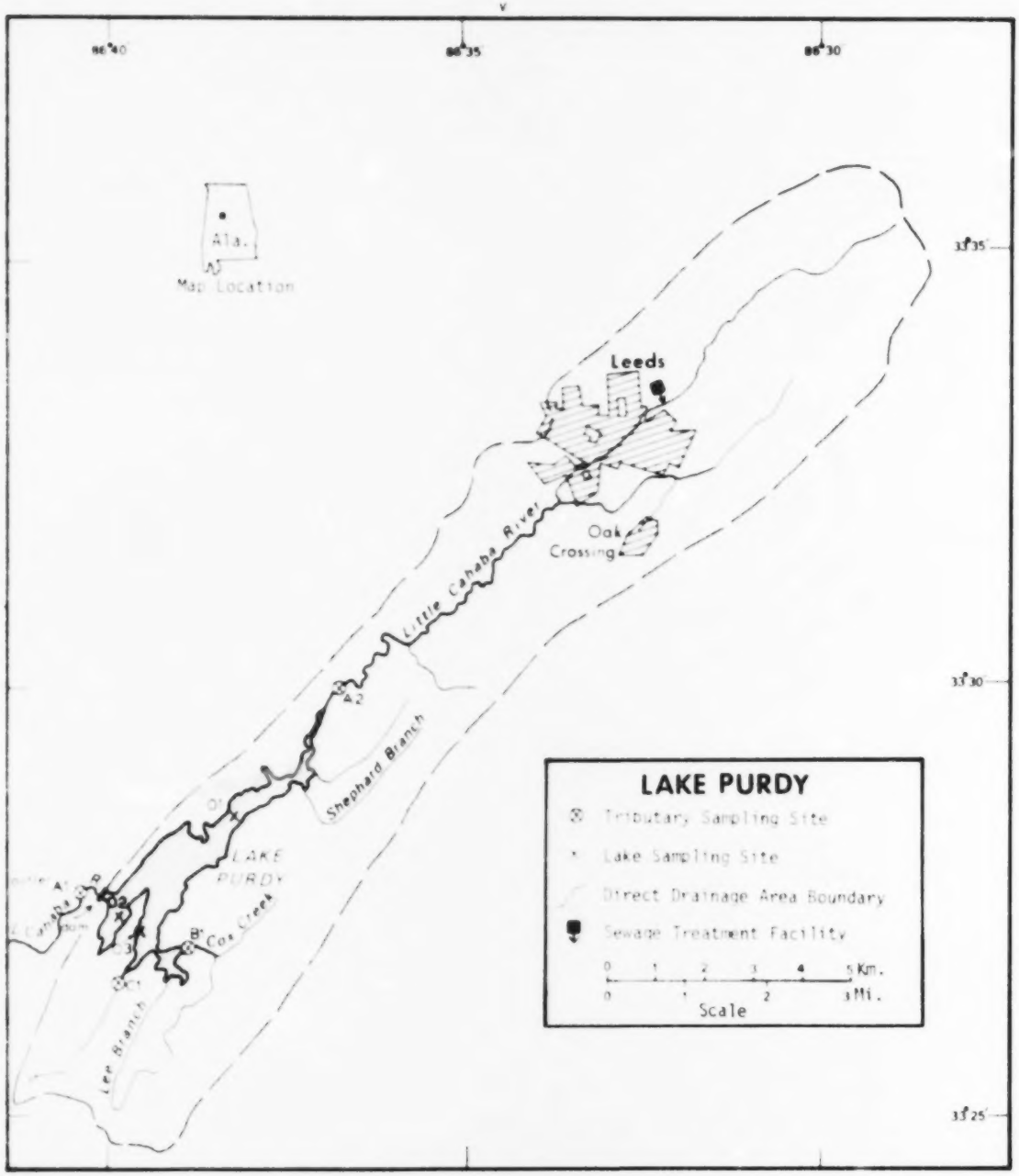
Major General Charles A. Rollo, Adjutant General of Alabama, and Project Officer Lt. Col. Wash B. Ray, who directed the volunteer efforts of the Alabama National Guardsmen, are also gratefully acknowledged for their assistance to the Survey.

NATIONAL EUTROPHICATION SURVEY

STUDY LAKES

STATE OF ALABAMA

LAKE NAME	COUNTY
Bankhead	Walker
Gantt	Covington
Guntersville	Marshall, Johnson
Holt Lock and Dam	Tuscaloosa
Lay	Chilton, Coosa
Martin	Elmore, Tallapoosa
Mitchell	Coosa, Chilton
Pickwick	Colbert, Lauderdale (Tishomingo in MS and Hardin in TN)
Purdy	Jefferson, Shelby
Weiss	Cherokee
Wilson	Lauderdale, Colbert, Lawrence


86°40
86°35
86°30
Ala.
Map Location
Leeds
Oak Crossing
Little Cahaba River
33°35'
33°30'
33°25'
A2
Shephard Branch
LAKE PURDY
Cox Creek
Lee Branch
LAKE PURDY
Tributary Sampling Site
Lake Sampling Site
Direct Drainage Area Boundary
Sewage Treatment Facility
0 1 2 3 4 5 Km.
0 1 2 3 Mi.
Scale

LAKE PURDY, ALABAMA

STORET NO. 0115

I. CONCLUSIONS

A. Trophic Condition:*

Lake Purdy is considered eutrophic, i.e., nutrient rich and highly productive, based upon field observations and analysis of Survey data. Whether such nutrient enrichment is to be considered beneficial or deleterious is determined by its actual or potential impact upon designated beneficial water uses of each lake.

Algal blooms were present during spring, summer, and fall samplings. The relatively high water transparency found in the spring deteriorated rapidly to a low of about 100 cm in the summer. Nutrient levels and the potential for primary productivity as measured by the algal assay control yields are relatively high. Dissolved oxygen concentrations were depressed with depth in the summer and hydrogen sulfide production was detected.

B. Rate-Limiting Nutrient:

The algal assay results indicate the rate-limiting nutrient in Lake Purdy was phosphorus. The ratio of inorganic nitrogen to orthophosphorus (N/P) during lake

*See Appendix E.

sampling in August indicates primary limitation by phosphorus. However, low N/P ratios in March and November indicate nitrogen limitation at those times.

C. Nutrient Controllability:

1. Point sources -

Point sources were estimated to contribute 54.8% of the total phosphorus load to Lake Purdy during the sampling year. The city of Leeds contributed this entire point source load.

The present calculated loading of 3.37 g $P/m^2/yr$ is about four times that proposed by Vollenweider (1975) as eutrophic for a lake with such volume and retention time. Although total elimination of point source contributions from the city of Leeds would not reduce loading to an oligotrophic level, it is likely that a high degree of phosphorus removal would reduce the incidence of algal blooms in the reservoir.

2. Nonpoint sources -

The mean annual phosphorus load from nonpoint sources was about 45.2% of the total reaching Lake Purdy. Measured tributaries accounted for about 37.4% of the total, and ungaged tributaries were estimated to account for 7.3%.

In general, few lakes are nitrogen limited as a result of low nitrogen. Rather, excessive phosphorus levels shift limitations to nitrogen or other factors. Regardless

of the primary nutrient limitation suggested by either algal assay or nutrient ratios, the most feasible approach to nutrient control, if desirable, is through available phosphorus control technology and subsequent establishment of phosphorus limitation within the water body.

II. LAKE AND DRAINAGE BASIN CHARACTERISTICS

Lake and drainage basin characteristics are itemized below. Lake surface area and mean depth were provided by the Alabama Water Improvement Commission; maximum depth was estimated on the basis of National Eutrophication Survey (NES) sampling data; tributary data were provided by the Alabama District Office of the U.S. Geological Survey (USGS) (outlet drainage area includes the lake surface area). Mean hydraulic retention time was obtained by dividing the lake volume by mean flow of the outlet. Precipitation values were estimated by methods as outlined in NES Working Paper No. 175. A table of metric/English conversions is included as Appendix A.

A. Lake Morphometry:

1. Surface area: 4.30 km^2.
2. Mean depth: 5.1 m.
3. Maximum depth: 15.2 m.
4. Volume: 21.930 x 10^6 m^3.
5. Mean hydraulic retention time: 110 days.

B. Tributary and Outlet (see Appendix B for flow data):

1. Tributaries -

Name	Drainage area(km^2)	Mean flow (m^3/sec)
A(2) Little Cahaba River	60.3	1.33
B(1) Cox Creek	8.3	0.18
C(1) Unnamed Creek	4.4	0.09
Minor tributaries and immediate drainage -	29.2	0.73
Totals	102.2	2.33
2. Outlet - A(1) Little Cahaba River	106.4	2.33

C. Precipitation:

1. Year of sampling: 61.3 cm.

2. Mean annual: 53.2 cm.

III. LAKE WATER QUALITY SUMMARY

Lake Pur y was sampled three times during the open-water season of 1973 by means of a pontoon-equipped Huey helicopter. Each time, samples for physical and chemical parameters were collected from three stations on the lake and from one or more depths at each station (see map, page v). During each visit, depth-integrated samples were collected from each station for chlorophyll a analysis and phytoplankton identification and enumeration. During the first visit, a single 18.9-liter depth-integrated sample was composited for algal assays. Maximum depths sampled were 4.0 m at Station 1, 13.7 m at Station 2, and 3.7 m at Station 3. For a more detailed explanation of NES methods, see NES Working Paper No. 175.

The results obtained are presented in full in Appendix C and are summarized in III A for waters at the surface and at the maximum depth for each site. Results of the phytoplankton counts and chlorophyll a determinations are included in III B. Results of the limiting nutrient study are presented in III C.

LAKE MUNDY
STORET CODE 0115

PHYSICAL AND CHEMICAL CHARACTERISTICS

PARAMETER		(3/14/73)				(6/30/73)				(11/ 2/73)			
		S*** = 3				S*** = 3				S*** = 3			
	N*	RANGE	MEDIAN	MAX DEPTH RANGE (METERS)	N*	RANGE	MEDIAN	MAX DEPTH RANGE (METERS)	N*	RANGE	MEDIAN	MAX DEPTH RANGE (METERS)	
TEMPERATURE (DEG CENT)													
0.-1.5 M DEPTH	4	17.5- 18.4	18.1	0.0- 1.5	5	28.8- 30.4	29.2	0.0- 1.5	5	15.5- 18.6	17.8	0.0- 1.5	
MAX DEPTH**	3	10.0- 17.6	15.9	3.4- 13.7	3	17.7- 28.4	27.1	1.8- 12.2	3	15.5- 17.7	17.7	0.0- 8.5	
DISSOLVED OXYGEN (MG/L)													
0.-1.5 M DEPTH	1	8.8- 8.8	8.8	1.5- 1.5	3	3.1- 7.8	6.6	0.0- 1.5	3	8.2- 9.6	8.8	0.0- 1.5	
MAX DEPTH**	3	8.4- 8.8	8.6	3.4- 13.7	3	0.4- 1.2	1.2	1.8- 12.2	3	7.4- 9.6	8.8	0.0- 8.5	
CONDUCTIVITY (UMHOS)													
0.-1.5 M DEPTH	4	205.- 235.	220.	0.0- 1.5	5	156.- 166.	162.	0.0- 1.5	5	170.- 180.	178.	0.0- 1.5	
MAX DEPTH**	3	195.- 240.	230.	3.4- 13.7	3	186.- 223.	215.	1.8- 12.2	3	170.- 180.	180.	0.0- 8.5	
PH (STANDARD UNITS)													
0.-1.5 M DEPTH	4	8.3- 8.4	8.3	0.0- 1.5	5	8.2- 9.0	8.6	0.0- 1.5	5	7.1- 8.7	8.4	0.0- 1.5	
MAX DEPTH**	3	7.7- 8.3	8.3	3.4- 13.7	3	7.4- 8.2	7.8	1.8- 12.2	3	7.1- 8.2	8.2	0.0- 8.5	
TOTAL ALKALINITY (MG/L)													
0.-1.5 M DEPTH	4	94.- 101.	100.	0.0- 1.5	5	58.- 71.	65.	0.0- 1.5	5	39.- 108.	93.	0.0- 1.5	
MAX DEPTH**	3	89.- 108.	99.	3.4- 13.7	3	72.- 130.	80.	1.8- 12.2	3	39.- 108.	99.	0.0- 8.5	
TOTAL P (MG/L)													
0.-1.5 M DEPTH	4	0.090-0.101	0.092	0.0- 1.5	5	0.028-0.039	0.033	0.0- 1.5	5	0.035-0.082	0.057	0.0- 1.5	
MAX DEPTH**	3	0.090-0.102	0.096	3.4- 13.7	3	0.034-0.141	0.060	1.8- 12.2	3	0.035-0.059	0.050	0.0- 8.5	
DISSOLVED ORTHO P (MG/L)													
0.-1.5 M DEPTH	4	0.032-0.060	0.036	0.0- 1.5	5	0.004-0.022	0.014	0.0- 1.5	5	0.006-0.016	0.012	0.0- 1.5	
MAX DEPTH**	3	0.013-0.060	0.026	3.4- 13.7	3	0.013-0.032	0.014	1.8- 12.2	3	0.006-0.016	0.013	0.0- 8.5	
NO2+NO3 (MG/L)													
0.-1.5 M DEPTH	4	0.030-0.220	0.080	0.0- 1.5	5	0.070-0.190	0.140	0.0- 1.5	5	0.030-0.060	0.030	0.0- 1.5	
MAX DEPTH**	3	0.050-0.150	0.140	3.4- 13.7	3	0.050-0.110	0.110	1.8- 12.2	3	0.040-0.060	0.050	0.0- 8.5	
AMMONIA (MG/L)													
0.-1.5 M DEPTH	4	0.050-0.110	0.055	0.0- 1.5	5	0.130-0.240	0.200	0.0- 1.5	5	0.030-0.070	0.040	0.0- 1.5	
MAX DEPTH**	3	0.040-0.080	0.070	3.4- 13.7	3	0.200-1.460	0.330	1.8- 12.2	3	0.040-0.070	0.070	0.0- 8.5	
KJELDAHL N (MG/L)													
0.-1.5 M DEPTH	4	0.400-1.000	0.600	0.0- 1.5	5	0.800-1.900	1.500	0.0- 1.5	5	0.500-1.000	0.700	0.0- 1.5	
MAX DEPTH**	3	0.200-0.400	0.300	3.4- 13.7	3	0.900-2.100	0.900	1.8- 12.2	3	0.500-0.600	0.600	0.0- 8.5	
SECCHI DISC (METERS)													
	3	0.9- 3.0	2.7		3	0.9- 1.1	1.0		3	1.5- 1.5	1.5		

* N = NO. OF SAMPLES
** MAXIMUM DEPTH SAMPLED AT EACH SITE
*** S = NO. OF SITES SAMPLED ON THIS DATE

B. Biological Characteristics:

1. Phytoplankton -

Sampling Date	Dominant Genera		Algal Units per ml
03/19/73	1.	Anabaena	542
	2.	Flagellates	362
	3.	Melosira	90
	4.	Dinobryon	78
	5.	Lyngbya	36
	6.	Nitzschia	36
		Other genera	152
		Total	1,296
08/30/73	1.	Merismopedia	1,512
	2.	Oscillatoria	605
	3.	Melosira	397
	4.	Flagellates	378
	5.	Anabaena	377
		Other genera	926
		Total	4,195
11/02/73	1.	Melosira	1,890
	2.	Coelosphaerium	724
	3.	Anabaena	671
	4.	Flagellates	618
	5.	Cryptomonas	194
		Other genera	990
		Total	5,087

2. Chlorophyll *a* -

Sampling Date	Station Number	Chlorophyll *a* (µg/liter)
03/19/73	1	5.1
	2	5.2
	3	2.8
08/30/73	1	15.5
	2	11.9
	3	14.3
11/02/73	1	25.5
	2	23.4
	3	10.7

C. Limiting Nutrient Study:

1. Autoclaved, filtered, and nutrient spiked -

Spike(mg/l)	Ortho P Conc.(mg/l)	Inorganic N Conc.(mg/l)	Maximum Yield (mg/l-dry wt.)
Control	0.016	0.167	2.6
0.010 P	0.026	0.167	4.4
0.020 P	0.036	0.167	5.2
0.050 P	0.066	0.167	5.0
0.025 P + 0.5 N	0.041	0.667	13.9
0.050 P + 1.0 N	0.066	1.167	25.4
1.00 N	0.016	1.167	2.3

2. Filtered and nutrient spiked -

Spike(mg/l)	Ortho P Conc.(mg/l)	Inorganic N Conc.(mg/l)	Maximum Yield (mg/l-dry wt.)
Control	0.017	0.150	2.4
0.010 P	0.027	0.150	3.7
0.020 P	0.037	0.150	4.2
0.050 P	0.067	0.150	4.6
0.025 P + 0.5 N	0.042	0.650	16.1
0.050 P + 1.0 N	0.067	1.150	28.4
1.00 N	0.017	1.150	2.8

3. Discussion -

The results of the algal assay with Selenastrum capricornutum indicate that the potential primary productivity of Lake Purdy was relatively high at the time the sample was collected. Also, the increased yields with increased levels of orthophosphate (to about 36 µg/liter) indicate the lake is phosphorus limited. No growth response accompanied spikes of nitrogen alone.

The N/P ratio in the field samples was 25/1 in August, suggesting primary limitation by phosphorus. However, the N/P ratios for March and November were 5/1 and 7/1, respectively, indicating nitrogen limitation at those times (a mean N/P ratio of 14/1 or greater generally reflects phosphorus limitation).

IV. NUTRIENT LOADINGS
(See Appendix D for data)

For the determination of nutrient loadings, the Alabama National Guard collected monthly near-surface grab samples from each of the tributary sites indicated on the map (page v), except for the high runoff months of January and February when two samples were collected. Sampling was begun in March 1973 and was completed in February 1974.

Through an interagency agreement, stream flow estimates for the year of sampling and a "normalized" or average year were provided by the Alabama District Office of the USGS for the tributary sites nearest the lake.

In this report, nutrient loads for sampled tributaries were determined by using a modification of a USGS computer program for calculating stream loadings. Nutrient loads indicated for tributaries are those measured minus known point source loads, if any.

Nutrient loadings for unsampled "minor tributaries and immediate drainage" ("ZZ" of USGS) were estimated by using the mean annual nutrient loads, in $kg/km^2/yr$ for Cox Creek and Unnamed Creek at stations B(1) and C(1), and multiplying the means by the ZZ drainage area in km^2.

Nutrient loads for the city of Leeds wastewater treatment plant were estimated at 1.134 kg P and 3.401 kg N/Capita/yr.

A. Waste Sources:

1. Known municipal -

Name	Population Served *	Treatment *	Mean Flow ($m^3/d \times 10^3$)	Receiving Water
Leeds	7000	Trickling Filter	2.650**	Little Cahaba River

2. Known industrial - None

B. Annual Total Phosphorus Loading - Average Year:

1. Inputs -

Source	kg P/yr	% of total
a. Tributaries (nonpoint load) -		
A(2) Little Cahaba River	4,970	34.3
B(1) Cox Creek	285	2.0
C(1) Unnamed Creek	165	1.1
b. Minor tributaries and immediate drainage (nonpoint load) -	1,050	7.3
c. Known municipal STP's - Leeds	7,940	54.8
d. Septic tanks*** -	5	<0.1
e. Known industrial - None		
f. Direct precipitation**** -	75	0.5
Totals	14,490	100.0

2. Outputs - A(1) Little Cahaba River 5,825

3. Net annual P accumulation - 8,665

*U.S. EPA, 1971.
**Estimated at 0.3785 m^3/capita/day.
***Estimate based on 25 lakeshore residences.
****Estimated (See NES Working Paper No. 175).

C. Annual Total Nitrogen Loading - Average Year:

1. Inputs -

Source	kg N/yr	% of total
a. Tributaries (nonpoint load) -		
A(2) Little Cahaba River	26,520	32.7
B(1) Cox Creek	6,745	8.3
C(1) Unnamed Creek	1,700	2.1
b. Minor tributaries and immediate drainage (nonpoint load) -	17,520	21.6
c. Known municipal STP's - Leeds	23,805	29.3
d. Septic tanks* -	265	0.3
e. Known industrial - None		
f. Direct precipitation** -	4,640	5.7
Totals	81,195	100.0

2. Outputs - A(1) Little Cahaba River 69,375

3. Net annual N accumulation - 11,820

D. Mean Annual Nonpoint Nutrient Export by Subdrainage Area:

Tributary	kg P/km^2/yr	kg N/km^2/yr
A(2) Little Cahaba River	82	440
B(1) Cox Creek	34	813
C(1) Unnamed Creek	38	386

*Estimate based on 25 lakeshore residences.
**Estimated (see NES Working Paper No. 175).

F. Yearly Loadings:

In the following table, the existing phosphorus annual loading is compared to the relationship proposed by Vollenweider (1975). Essentially, his eutrophic loading is that at which the receiving waters would become eutrophic or remain eutrophic; his oligotrophic loading is that which would result in the receiving water remaining oligotrophic or becoming oligotrophic if morphometry permitted. A mesotrophic loading would be considered one between eutrophic and oligotrophic.

Note that Vollenweider's model may not apply to lakes with short hydraulic retention times or in which light penetration is severely restricted by high concentrations of suspended solids in the surface waters.

	Total Yearly Phosphorus Loading ($g/m^2/yr$)
Estimated loading for Lake Purdy	3.37
Vollenweider's eutrophic loading	0.80
Vollenweider's oligotrophic loading	0.39

V. LITERATURE REVIEWED

U.S. EPA, 1971. "Inventory of Wastewater Treatment Facilities" Volume 4. Office of Media Programs, Office of Water Programs, Washington, D.C.

U.S. Environmental Protection Agency. 1975. National Eutrophication Survey Methods 1973-1976. NES Working Paper No. 175. National Environmental Research Center, Las Vegas, Nevada, and Pacific Northwest Environmental Research Laboratory, Corvallis, Oregon.

Vollenweider, R. A., 1975. Input-Output Models With Final Reference to the Phosphorus Loading Concept in Limnology. Schweiz. A. Hydrol. 37: 53-84.

VI. APPENDICES

APPENDIX A

CONVERSION FACTORS

CONVERSION FACTORS

Hectares x 2.471 = acres

Kilometers x 0.6214 = miles

Meters x 3.281 = feet

Cubic meters x 8.107×10^{-4} = acre/feet

Square kilometers x 0.3861 = square miles

Cubic meters/sec x 35.315 = cubic feet/sec

Centimeters x 0.3937 = inches

Kilograms x 2.205 = pounds

Kilograms/square kilometer x 5.711 = lbs/square mile

APPENDIX B

TRIBUTARY FLOW DATA

TRIBUTARY FLOW INFORMATION FOR ALABAMA 07/22/76

LAKE CODE 0115 LAKE PURDY

TOTAL DRAINAGE AREA OF LAKE(SQ KM) 106.4

TRIBUTARY	SUB-DRAINAGE AREA(SQ KM)	NORMALIZED FLOWS(CMS) JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN
0115A1	106.4	2.55	2.97	3.96	2.80	2.61	1.70	1.90	1.87	1.98	1.98	1.70	1.98	2.33
0115A2	60.3	2.07	2.07	2.27	1.59	1.47	0.96	1.08	1.05	0.65	0.51	0.42	1.81	1.33
0115M1	8.3	0.283	0.283	0.311	0.218	0.204	0.133	0.147	0.144	0.088	0.068	0.0	0.249	0.177
0115C1	4.4	0.150	0.150	0.164	0.116	0.108	0.071	0.079	0.076	0.045	0.037	0.0	0.133	0.094
0115Z2	33.4	1.13	1.13	1.25	0.88	0.82	0.54	0.59	0.59	0.34	0.28	0.24	0.99	0.73

SUMMARY

TOTAL DRAINAGE AREA OF LAKE = 106.4
SUM OF SUB-DRAINAGE AREAS = 106.4
TOTAL FLOW IN = 27.99
TOTAL FLOW OUT = 28.01

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
0115A1	3	73	5.663	4	5.097				
	4	73	5.097	2	8.495				
	5	73	3.398	4	2.209				
	6	73	1.586	18	1.331				
	7	73	2.039	13	1.359				
	8	73	1.982	16	1.727				
	9	73	2.039	11	2.747				
	10	73	2.322	5	1.756				
	11	73	1.529	2	1.555				
	12	73	1.138	7	0.855				
	1	74	6.898	12	12.675	25	3.639		
	2	74	5.542	9	4.950	23	10.534		
0115A2	3	73	3.398	4	2.403				
	4	73	2.605	2	3.200				
	5	73	1.869	4	1.246				
	6	73	0.878	18	0.538				
	7	73	1.161	13	0.566				
	8	73	0.793	16	0.765				
	9	73	0.453	11	0.368				
	10	73	0.595	5	0.425				
	11	73	0.991	2	0.003				
	12	73	2.461	7	0.957				
	1	74	3.738	12	6.853	25	1.846		
	2	74	3.087	9	2.158	23	4.672		

TRIBUTARY FLOW INFORMATION FOR ALABAMA 07/22/76

LAKE CODE 0115 LAKE PUNDY

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
0115M1	3	73	0.453	4	0.368				
	4	73	0.368	2	0.453				
	5	73	0.258	4	0.173				
	6	73	0.122	18	0.074				
	7	73	0.159	13	0.076				
	8	73	0.108	16	0.105				
	9	73	0.0	5	0.0	11	0.0		
	10	73	0.082	5	0.0				
	11	73	0.134	2	0.0				
	12	73	0.337	7	0.130				
	1	74	0.515	12	0.940	25	0.255		
	2	74	0.428	9	0.297	23	0.643		
0115C1	3	73	0.246	4	0.193				
	4	73	0.190	2	0.232				
	5	73	0.136	4	0.091				
	6	73	0.065	18	0.040				
	7	73	0.082	13	0.040				
	8	73	0.057	16	0.057				
	9	73	0.0	5	0.0	11	0.0		
	10	73	0.042	5	0.0				
	11	73	0.074	2	0.0				
	12	73	0.178	7	0.071				
	1	74	0.275	12	0.501	25	0.136		
	2	74	0.227	9	0.159	23	0.343		
0115Z2	3	73	1.877	4	1.453				
	4	73	1.447	2	1.764				
	5	73	1.042	4	0.691				
	6	73	0.487	18	0.294				
	7	73	0.634	13	0.311				
	8	73	0.433	16	0.419				
	9	73	0.252	11	0.167				
	10	73	0.328	5	0.244				
	11	73	0.549	2	0.002				
	12	73	1.371	7	0.530				
	1	74	2.076	12	3.794	25	1.022		
	2	74	1.722	9	1.195	23	2.594		

APPENDIX C

PHYSICAL AND CHEMICAL DATA

STORET RETRIEVAL DATE 76/07/22

011501
33 28 42.0 086 38 13.0 3
LAKE PURDY
01073 ALABAMA

033692

11EPALES 2111202
0015 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/03/19	13 40	0000	18.1		36	235	8.30	99	0.110	0.800	0.220	0.060
	13 40	0005	18.2	8.8		230	8.40	100	0.060	0.400	0.120	0.059
	13 40	0011	17.6	8.6		230	8.30	99	0.070	0.400	0.140	0.060
73/08/30	09 20	0000	29.2		35	156	8.60	63	0.240	1.900	0.190	0.014
	09 20	0005	28.6	6.6		160	8.20	66	0.230	1.300	0.140	0.012
	09 20	0013	27.1	1.2		215	7.80	80	0.330	0.900	0.110	0.014
73/11/02	09 20	0000	17.8		60	176	8.70	94	0.040	1.000	0.030	0.016
	09 20	0005	17.7	9.6		176	7.10	39	0.070	0.500	0.060	0.016

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/03/19	13 40	0000	0.096	5.1
	13 40	0005	0.101	
	13 40	0011	0.102	
73/08/30	09 20	0000	0.049	15.5
	09 20	0005	0.059	
	09 20	0013	0.060	
73/11/02	09 20	0000	0.082	25.5
	09 20	0005	0.056	

STORET RETRIEVAL DATE 76/07/22

011502
33 27 32.0 086 39 57.0 3
LAKE PURDY
01117 ALABAMA
033692

11EPALES 2111202
0049 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/03/19	14	10 0000	18.4		120	210	8.80	101	0.050	1.000	0.030	0.012
	14	10 0006	17.2	10.4		205	8.80	101	0.040	0.200	0.030	0.013
	14	10 0012	16.4	9.5		210	8.70	102	0.040	0.200	0.030	0.014
	14	10 0018	11.2	8.7		230	8.20	107	0.050	0.200	0.080	0.014
	14	10 0025	10.5	7.4		230	8.00	107	0.060	0.200K	0.110	0.016
	14	10 0035	10.2	4.6		240	7.80	108	0.070	0.200	0.150	0.025
	14	10 0045	10.0	4.4		240	7.70	108	0.080	0.300	0.150	0.026
73/08/30	09	45 0000	30.4		38	163	9.00	65	0.200	1.600	0.180	0.009
	09	45 0005	29.2	3.1		166	8.30	71	0.130	0.800	0.070	0.022
	09	45 0015	26.6	0.0		248	7.70	103	0.310	0.800	0.130	0.026
	09	45 0025	24.6	0.0		263	7.50	114	0.560	0.900	0.090	0.051
	09	45 0035	20.5	0.0		252	7.40	128	1.610	2.400	0.070	0.069
	09	45 0040	17.7	0.4		223	7.40	130	1.460	2.100	0.050	0.032
73/11/02	09	30 0000	18.5		60	179	8.40	93	0.030	0.800	0.030	0.009
	09	30 0005	18.6	8.2		178	8.40	92	0.030	0.700	0.030	0.012
	09	30 0010	18.5	8.0		178	8.40	94	0.030	0.700	0.030	0.009
	09	30 0015	18.5	7.8		178	8.30	95	0.040	0.800	0.030	0.007
	09	30 0020	18.5	7.6		178	8.30	96	0.040	0.600	0.030	0.011
	09	30 0028	17.7	7.4		180	8.20	99	0.070	0.600	0.040	0.013

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/07/22

011502
33 27 32.0 086 39 57.0 3
LAKE PURDY
01117 ALABAMA
033692

11EPALES 2111202
0049 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/03/19	14 10	0000	0.049	5.2
	14 10	0006	0.047	
	14 10	0012	0.032	
	14 10	0018	0.029	
	14 10	0025	0.035	
	14 10	0035	0.050	
	14 10	0045	0.046	
73/08/30	09 45	0000	0.032	11.9
	09 45	0005	0.028	
	09 45	0015	0.052	
	09 45	0025	0.110	
	09 45	0035	0.279	
	09 45	0040	0.141	
73/11/02	09 30	0000	0.060	23.4
	09 30	0005	0.057	
	09 30	0010	0.059	
	09 30	0015	0.048	
	09 30	0020	0.049	
	09 30	0028	0.059	

STORET RETRIEVAL DATE 76/07/22

011503
33 27 25.0 086 39 24.0 3
LAKE PURDY
01117 ALABAMA
033692

11EPALES 2111202
0017 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/03/19	15	15 0000	17.5		108	205	8.60	94	0.050	0.400	0.040	0.014
	15	15 0006	17.2	7.9		215	7.50	95	0.030	0.200K	0.040	0.014
	15	15 0012	15.9	8.8		195	8.30	89	0.040	0.200	0.050	0.013
73/08/30	10	15 0000	30.4	7.8	44	162	8.90	58	0.200	1.500	0.140	0.014
	10	15 0006	28.4	1.2		186	8.20	72	0.200	0.900	0.110	0.013
73/11/02	10	10 0000	15.5	8.8	58	180	8.20	108	0.040	0.600	0.050	0.006

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/03/19	15	15 0000	0.036	2.8
	15	15 0006	0.040	
	15	15 0012	0.040	
73/08/30	10	15 0000	0.033	14.3
	10	15 0006	0.034	
73/11/02	10	10 0000	0.035	10.7

K VALUE KNOWN TO BE
LESS THAN INDICATED

APPENDIX D

TRIBUTARY AND WASTEWATER TREATMENT PLANT DATA

STORET RETRIEVAL DATE 76/07/22

0115A1 LS0115A1
33 27 30.0 086 40 30.0 4
LITTLE CAHABA RIVER
01 7.5 CAHABA HTS
0/LAKE PURDY 033692
XING RD LEADIN TO DAM .25 MI BELO DAM
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/04	08 30		0.100	0.780	0.023	0.022	0.050
73/04/02	14 40		0.078	1.400	0.080	0.028	0.050
73/05/04	17 30		0.147	0.640	0.120	0.044	0.060
73/06/18	09 50		0.176	2.940	0.320	0.072	0.100
73/07/13	12 55		0.189	0.580	0.250	0.078	0.115
73/08/16	17 45		0.160	0.630	0.460	0.068	0.155
73/09/05	09 45		0.086	1.050	0.810	0.099	0.145
73/10/05	13 00		0.095	1.200	0.520	0.060	0.150
73/11/02	14 30		0.070	0.750	0.210		0.060
73/12/07	14 45		0.192	0.400	0.040	0.016	0.016
74/01/12	10 15		0.232	0.400	0.048	0.040	0.070
74/01/25	14 55		0.216	0.300	0.044	0.036	0.065
74/02/09	11 14		0.152	0.200	0.020	0.025	0.045
74/02/23	11 30		0.084	0.300	0.015	0.020	0.045

STORET RETRIEVAL DATE 76/07/22

011542 LS011542
33 30 00.0 086 37 00.0 4
LITTLE CAHABA RIVER
01 7.5 VANDIVER
1/LAKE PURDY 033692
AING OF RD HEADING NW OFF CO HWY 27
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/04	09 00		0.300	1.760	0.160	0.140	0.250
73/04/02	15 28		0.336	1.320	0.071	0.048	0.075
73/05/04	18 00		0.470	0.940	0.132	0.210	0.270
73/06/18	11 30		0.550	1.260	0.130	0.190	0.260
73/07/13	13 20		0.630	0.920	0.220	0.300	0.390
73/08/16	18 30		0.740	0.580	0.176	0.450	0.540
73/09/05	09 00		0.670	0.580	0.231	0.470	0.525
73/10/05	13 30		0.480	0.460	0.140	0.300	0.350
73/11/02	15 00		0.500	0.350	0.078		0.660
73/12/07	14 20		0.540	0.800	0.200	0.352	0.410
74/01/12	09 45		0.320	0.300	0.036	0.062	0.115
74/01/25	14 30		0.480	0.400	0.062	0.118	0.190
74/02/09	10 20		0.440	0.200	0.065	0.080	0.130
74/02/23	10 50		0.368	0.300	0.060	0.065	0.120

STORET RETRIEVAL DATE 76/07/22

011581 LS011581
43 27 00.0 080 39 00.0 4
COX CREEK
01 7.5 CANABA MTS
T/LAKE PURDY 033692
BANK FROM RD ESE OFF HWY 27.3 COX CK BRD
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/04	08 45		0.030	1.000	0.048	0.016	0.025
73/04/02	15 05		0.060	4.600	0.110	0.005K	0.020
73/05/04	17 50		0.050	1.050	0.028	0.008	0.020
73/06/18	11 50		0.044	1.800	0.027	0.036	0.095
73/07/13	12 25		0.089	0.630	0.054	0.016	0.065
73/08/16	18 10		0.011	3.700	0.300	0.039	0.215
73/09/05	09 25		0.011	0.500	0.038	0.015	0.060
73/10/05	13 15		0.010K	0.780	0.040	0.016	0.090
73/12/07	14 30		0.060	0.200	0.020	0.012	0.020
74/01/12	09 50		0.136	0.100	0.032	0.016	0.015
74/01/25	14 40		0.040	0.100	0.016	0.008	0.030
74/02/04	10 44		0.044	0.100K	0.005	0.005	0.005
74/02/23	11 05		0.060	0.100K	0.015	0.010	0.015

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/07/22

011SCI LS011SCI
33 25 30.0 086 40 00.0 4
UNNAMED CREEK
01 7.5 CAHABA MTS
T/LAKE PURDY 033692
AIRD RD TO DAM SITE HEADINGNW OFF HWY 27
TIEPALES 211204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/04	08 35		0.016K	0.500	0.024	0.00K	0.010
73/04/02	14 30		0.010K	0.810	0.032	0.005K	0.005K
73/05/04	17 40		0.063	2.100	0.07K	0.01K	0.135
73/08/15	14 00		0.115	0.650	0.315	0.035	0.270
74/01/12	10 00		0.032	0.200	0.020	0.00K	0.010
74/01/25	14 45		0.032	0.100K	0.024	0.005K	0.015
74/02/04	10 58		0.005	0.100K	0.010	0.005	0.005
74/02/23	11 15		0.012	0.100K	0.015	0.005	0.005

K VALUE KNOWN TO BE
LESS THAN INDICATED

APPENDIX E

PARAMETRIC RANKINGS OF LAKES SAMPLED BY NES IN 1974 STATE OF ALABAMA

LAKE DATA TO BE USED IN RANKINGS

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SEC	MEAN CHLORA	15-MIN DO	MEDIAN DISS ORTHO P
0101	BANKHEAD LAKE	0.029	0.770	452.667	4.017	14.900	0.007
0103	GANTT RESERVOIR	0.029	0.300	465.778	2.144	14.000	0.008
0104	GUNTERSVILLE RESERVOIR	0.044	0.480	461.111	8.567	12.200	0.014
0105	HOLT LOCK AND DAM	0.018	0.835	449.417	2.183	13.600	0.006
0106	LAY LAKE	0.076	0.390	470.778	7.056	13.000	0.032
0107	MARTIN LAKE	0.017	0.170	435.250	6.407	15.000	0.004
0108	MITCHELL LAKE	0.053	0.290	466.000	6.211	12.400	0.022
0109	PICKWICK LAKE	0.056	0.535	455.000	2.450	11.900	0.035
0112	WEISS RESERVOIR	0.092	0.260	478.389	11.261	14.900	0.034
0114	WILSON LAKE	0.053	0.460	447.714	7.400	10.200	0.022
0115	LAKE PURDY	0.049	0.170	437.889	12.711	15.000	0.014

PERCENT OF LAKES WITH HIGHER VALUES (NUMBER OF LAKES WITH HIGHER VALUES)

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SEC	MEAN CHLOR A	15-MIN DO	MEDIAN DISS ORTHO P	INDEX NO
0101	HANKHEAD LAKE	75 (7)	10 (1)	60 (6)	70 (7)	25 (2)	80 (8)	320
0103	GANTT RESERVOIR	75 (7)	60 (6)	30 (3)	100 (10)	40 (4)	70 (7)	375
0104	GUNTERSVILLE RESERVOIR	60 (6)	30 (3)	40 (4)	20 (2)	80 (8)	55 (5)	285
0105	HOLT LOCK AND DAM	90 (9)	0 (0)	70 (7)	90 (9)	50 (5)	90 (9)	340
0106	LAY LAKE	10 (1)	50 (5)	10 (1)	40 (4)	60 (6)	20 (2)	140
0107	MARTIN LAKE	100 (10)	95 (9)	100 (10)	50 (5)	5 (0)	100 (10)	450
0108	MITCHELL LAKE	40 (4)	70 (7)	20 (2)	60 (6)	70 (7)	35 (3)	295
0109	PICKWICK LAKE	20 (2)	20 (2)	50 (5)	80 (8)	90 (9)	0 (0)	260
0112	WEISS RESERVOIR	0 (0)	80 (8)	0 (0)	10 (1)	25 (2)	10 (1)	125
0114	WILSON LAKE	30 (3)	40 (4)	80 (8)	30 (3)	100 (10)	35 (3)	315
0115	LAKE PURDY	50 (5)	95 (9)	90 (9)	0 (0)	5 (0)	55 (5)	295

LAKES RANKED BY INDEX NOS.

RANK	LAKE CODE	LAKE NAME	INDEX NO
1	0107	MARTIN LAKE	450
2	0105	HOLT LOCK AND DAM	390
3	0103	GANTT RESERVOIR	375
4	0101	BANKHEAD LAKE	320
5	0114	WILSON LAKE	315
6	0115	LAKE PURDY	295
7	0108	MITCHELL LAKE	295
8	0104	GUNTERSVILLE RESERVOIR	285
9	0109	PICKWICK LAKE	260
10	0106	LAY LAKE	190
11	0112	WEISS RESERVOIR	125